It's Time To Transition To Production – Now What?

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Abstract

When it's time to transition to production, it's easy to be too focused on the application itself and to overlook some areas crucial to your success. Learn about the 10 transition tasks that will ensure a smooth transition, and will prepare your organization to operate and use your system effectively.

Introduction

This paper addresses the processes used at the Jet Propulsion Laboratory to transition their business applications, processes and procedures from development into production. It describes the ten transition tasks which ensure a smooth transition and underscores the importance of coordination across these tasks. It also describes the lessons learned while deploying four releases over a six month period.

Background

About the Jet Propulsion Laboratory

The Jet Propulsion Laboratory (JPL), located in Pasadena, California is a non-profit federally funded research and development center (FFRDC) which is operated under contract by the California Institute of Technology (Caltech) for the National Aeronautics and Space Administration (NASA). JPL is part of the U.S. aerospace industry, and is the NASA center for the unmanned exploration of the universe. In addition to its work for NASA, JPL conducts tasks for a variety of other federal agencies such as the Dept. of Defense, the Dept. of Transportation, the Dept. of Energy, etc. JPL has approximately 5500 employees: 4500 in the technical divisions and 1000 in the administrative divisions. Its annual budget is approximately $1.4 billion.

Scope of the New Business Solutions (NBS) Project

The scope of the NBS Project included major business process reengineering for the areas of finance, services administration, asset management, acquisition and human resources. The new system was based on the Oracle Financials and Human Resources Management System (HRMS) for Smart Client (Oracle 10.7 SC). The system included the following Oracle applications and Oracle tools: Purchasing (PO), Payables (AP), Inventory (INV), Order Entry (OE), Fixed Assets (FA), Project Accounting (PA), General Ledger (GL), HRMS/Payroll, Web Employee, Web Supplier, GL Desktop Integrator (GLDI), and Discoverer 3.1. It also included five third party applications: Noetix Views, Resumix, In-Time Time and Attendance Management System for Oracle (TAMS/O), Registrar, and TravelMaster, and 25 custom applications: 11 new and 14 legacy.

From selection and procurement of the Oracle applications to the final delivery was a little over two years. The applications were transitioned into production over a six month period with four releases (June - December 1998). Releases 1 and 2 were relatively small and consisted of automated timekeeping and the budgeting tool, respectively. Release 3 was very large and consisted of acquisition, finance, services, assets and some timekeeping upgrades. Release 4 consisted of the Human Resources Management System (HRMS) with payroll, and more timekeeping upgrades.

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The NBS Project structure consisted of a Program Office and seven teams -- four functional teams and three supporting teams:

1. Finance Team
2. Services and Assets Team
3. Acquisition Team
4. Payroll, Human Resources and Timekeeping Team
5. Information Technology and Systems Engineering Team
6. Training Team
7. Communications Team

Each of the four functional teams consisted of personnel from the administrative business units who understood both the new and existing business processes, and also technical personnel or developers from the Product Implementation Section of the JPL Institutional Business Systems Division. JPL's implementation partners were Ernst and Young LLP and Oracle Corporation with support from Consulting Solutions, Inc., Krystal Solutions and other consulting firms. Technical infrastructure support, such as networking and file services, was provided by the JPL Enterprise Information System Project. Desktop system administration support was provided by OAO Corporation as part of the lab-wide contract for Desktop and Network Services.

Description of Transition Tasks

To ensure a smooth transition from development into operations/production, the following ten transition tasks must be performed, and coordination must occur across all these tasks:

1. Hardware/Software Rollout
2. Customer Support Readiness
3. System Operations Readiness
4. Business Operations Readiness
5. Business Applications Readiness
6. Data Conversion and Data Validation
7. System Integration and Test
8. End-User Training
9. Project Transition Communications
10. Management Readiness

The nature of each of these transition tasks and their importance for transitioning from development to operations/production is described in more detail below.

1. Hardware/Software Rollout:
   Includes identifying NBS user community and priorities for rollout, ensuring their hardware configuration is adequate to operate the NBS applications and replenishing it if it is not, and providing the necessary desktop software and configuration to support NBS applications, e.g., AFS, Microsoft SMS, Oracle Smart Client, Oracle Discoverer 3.1, printer registration, etc.

2. Customer Support Readiness:
   Includes all activities to support the NBS user community in reporting and troubleshooting problems related to desktop hardware and software, applications software and providing customer assistance; also includes defining interfaces and operating level agreements between the NBS Project, the Product Implementation Section for sustaining engineering, and the contractor for customer desktop support.

3. System Operations Readiness:
   Includes all activities to support the operations and maintenance of the production environment including server hardware, operating system, Oracle applications, other NBS applications, security, operations tools, and operations procedures; also includes instance management, configuration management, and support of fiscal year end and "Dark Period"/"Go Live" activities.

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4. Business Operations Readiness:
   Includes all activities to support the actual administrative business processes performed by the various functional organizations and which utilize the NBS applications, e.g., acquisition, asset management, human resources, etc.; also includes defining all policies and procedures for operations, creating any new job descriptions, making organizational changes and assigning personnel to support operations, etc.

5. Business Applications Readiness:
   Includes the completion of code development, application setup, unit testing, migration requests, and conducting of functional testing and user acceptance in Conference Room Pilot (CRP) test sessions for all NBS applications including Oracle applications, third party applications and custom applications; also includes updating documentation pertaining to process flows, business rules, setup, design, user instructions, etc.

6. Data Conversion/Data Validation
   Includes all activities pertaining to converting legacy data to the correct format and populating it into the production database; includes data conversion policies and routines, initial data conversion, final data conversion and data validation.

7. System Integration Testing
   Includes all activities pertaining to planning and conducting system integration testing for the business process threads utilizing NBS applications, the operations tools, and operations procedures; also includes performance testing and system end-to-end testing.

8. End-User Training
   Includes all activities pertaining to providing applications training for Subject Matter Experts, Functional users, Moderate users and General users, including curriculum development, class schedules, user registration, training environment, and classroom sessions.

9. Project Transition Communications
   Includes all activities pertaining to communicating issues related to transition to production, such as year-end cutoff dates, transition and "go live" schedules, availability of training and documentation, provisions for customer support, user preparation for NBS applications, processes for emergency transactions, demos, etc.

10. Management Readiness
    Includes all program management activities pertaining to supporting and ensuring a successful transition to production, such as the Transition Plan Review, Operational Readiness Reviews, Transition Status Reviews, schedule coordination, status monitoring, priorities, risk management, etc.

See Figure 1 for a diagram of these ten transition tasks and their inter-relatedness.

Managing the Transition Process

Planning and Responsibilities

Planning for transition to production began approximately three months prior to "Go Live", and culminated in a Transition Plan Review held two months prior to "Go Live". This review covered all aspects of the transition process and included the following type of material: review objectives, transition task overview, transition task objectives, scope of each delivery, a list of project interfaces, the transition task Work Breakdown Structure (WBS), a high-level summary of transition tasks, the transition process management approach, transition task resources and personnel, transition task schedule tree and task schedules, the business operations readiness checklist, the project interfaces with the various business units, the system operations readiness checklist, the applications readiness checklist, the detailed applications checklist, the overall project operational readiness checklist, risks and risk mitigation strategies, and issues and concerns. See Figure 2 for a diagram of the NBS Project interfaces and their relation to the Transition Tasks.

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Figure 1 Diagram of the 10 Transition Tasks and their Inter-Relatedness

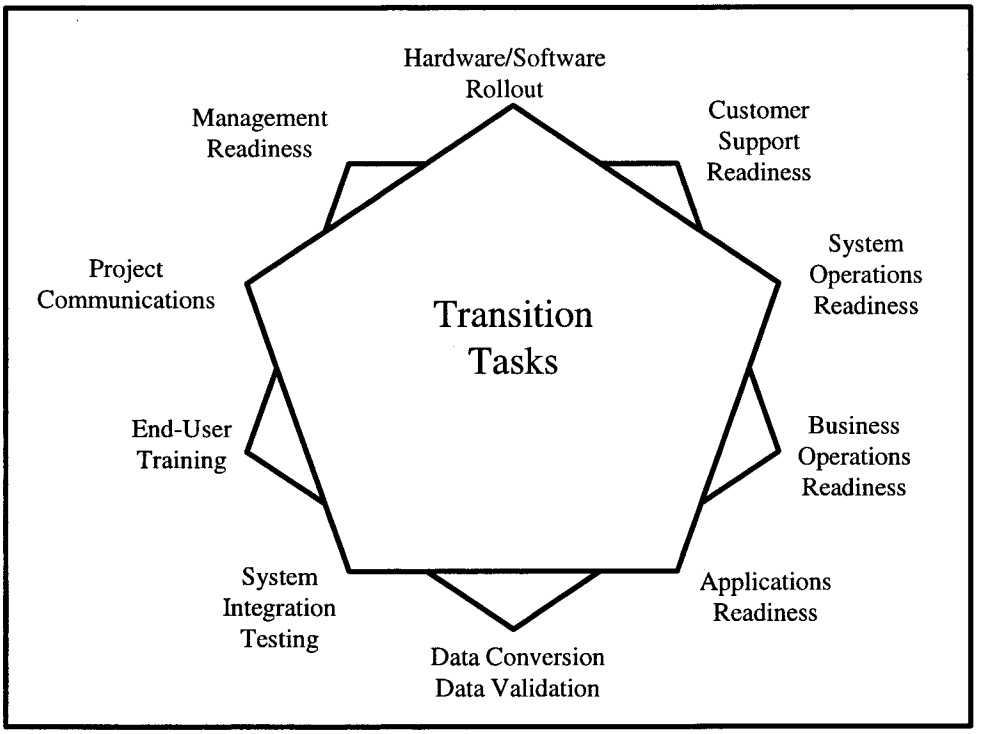
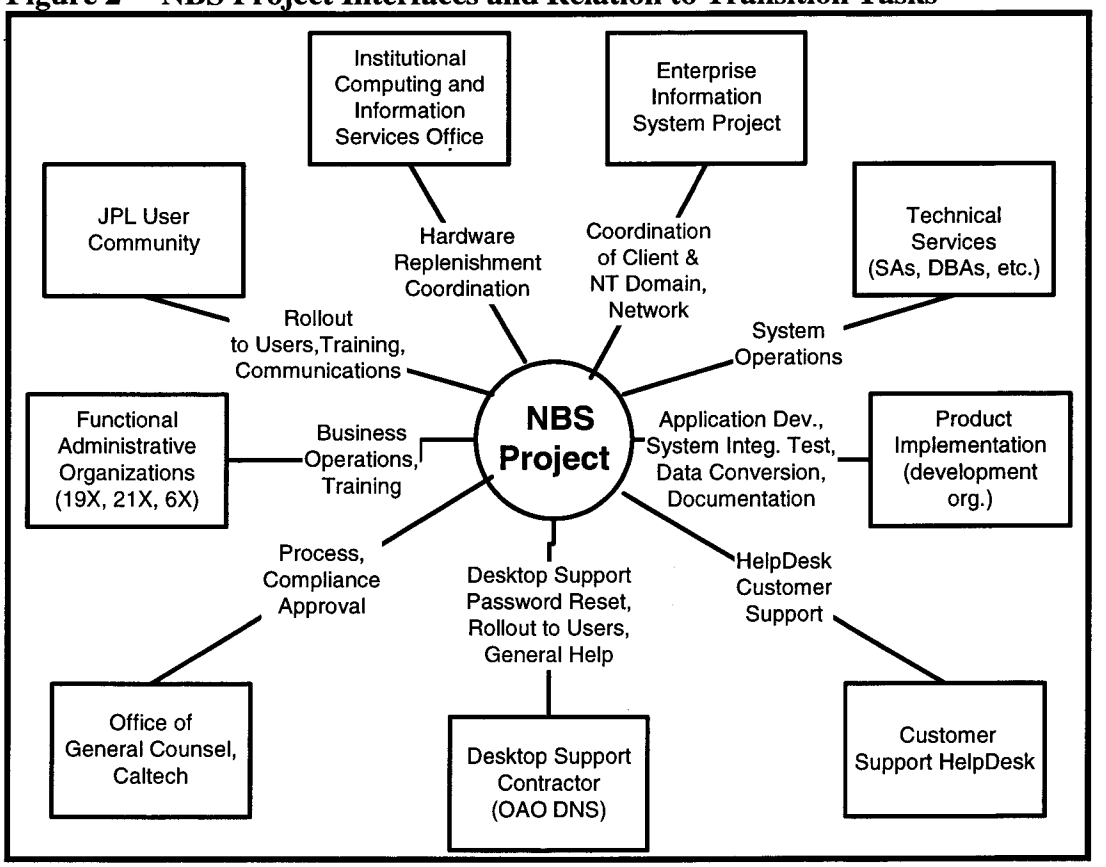


Figure 2 NBS Project Interfaces and Relation to Transition Tasks



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A separate Transition System Engineer was assigned to plan the transition process, coordinate and integrate across all transition tasks, and report status. This ensured that someone was looking across the entire system, and that problems and issues in one area that would affect other areas were communicated and worked in a timely manner. It also provided a focal point for collecting status, integrating the information, and preparing for weekly reviews.

The ten activities for the Transition Task were put into a Work Breakdown Structure (WBS), and a lead person (Transition Task Coordinator) was placed in charge of each activity. Transition Coordination/Status meetings with all the Transition Task Coordinators were held weekly to review the status of each activity, and to coordinate across the various sub-tasks. The Transition Task Coordinators reported status, metrics and issues.

A Transition Advisory Group (TAG) was formed to review the list of anomalies found, set priorities, make tradeoffs and expedite problem solutions. The TAG members consisted of four managers representing the Program Office, the Information Technology and Systems Engineering Team, the Training Team and the Product Implementation section. The TAG met twice daily, first thing in the morning and late in the afternoon, in order to stay on top of issues as they developed and to ensure that critical issues received the proper management attention. The morning meeting addressed issues and priorities and was used to review action requests. The afternoon meeting addressed the results of System Integration and Test and problems discovered. An automated problem management tool, Remedy Action Request System (ARS), was used project-wide for problem management and for recording action requests (ARs), i.e. problem tickets. The TAG set project priorities based on urgent, open ARs.

Reviews and Status Monitoring

An Operations Readiness Review (ORR) was held for each release approximately two weeks prior to "Go Live" for the smaller releases and three weeks prior for the major release. The status of all transition tasks and detailed checklists was presented, as well as any outstanding issues and concerns affecting the ability to "Go Live". Then weekly Transition Status Reviews (TSRs) were held following the ORR and for at least two weeks after each "Go Live". At the TSRs updated versions of the detailed checklists were presented, and progress towards resolving issues affecting "Go Live" was monitored.

Status was tracked using the designations of Red, Yellow and Green, with the following interpretations of each status. Red meant that a serious problem existed which would prevent the ability to "Go Live". Yellow meant that a problem existed which would affect "Go Live", but a workaround existed. Green meant that the task was on schedule and ready for "Go Live". Any item which was designated as Red or Yellow, required an explanation of the nature of the problem and a description of work needed and being done to resolve it.

Checklists and Visibility

For the Business Operations Readiness, lists of external interfaces with each business unit which supports NBS business operations, along with key contacts in each organization and within the project, were defined. Progress towards completing the items in the detailed Business Operations Readiness checklist was monitored weekly and tracked in a spreadsheet. If a business unit was designated as Red, meetings were held with the cognizant manager to clarify what needed to be done to ensure readiness, to identify roadblocks, and to make plans for resolving any issues. Often the business units underestimated the scope of what they needed to do to prepare for business operations using the new system and new procedures.

An Application Checklist was generated which listed each NBS application going into production, including Oracle applications, third party applications and custom applications. The checklist was organized according to function such as acquisition, finance or human resources. This allowed the teams to see the status of every application and ensured that nothing was overlooked or forgotten.

A System Operations Checklist was generated which identified all activities needed to support the operations and maintenance of the production environment. Of particular importance was the production job scheduling activity. The job scheduling required coordination between the functional teams and the technical operations teams to ensure the correct sequence and to allow for functional verification of job results. Also, a detailed checklist was created listing all automated operations tools and corresponding operations procedures necessary to support the production environment. This included tools for system administration, server backup, database backup, database

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administration, desktop software distribution, problem management, configuration management, disk/volume management, job scheduling, system and database monitoring, and server security.

Schedules

An overall Transition Task Schedule (Level 3 below the Project schedule) was generated which included each of the ten transition tasks and some highlights for each tasks, as well as dependencies. Then detailed (Level 4) schedules were generated for each of the ten transition tasks. In addition, detailed schedules were generated for the fiscal year-end close out and the "dark period" before "Go Live". A schedule administrator collected schedule updates weekly from each Task Coordinator and the Transition System Engineer, and then published the schedule before each Transition Coordination meeting.

Each of the releases involved a "dark period", a time during which the system was inaccessible to the end-users and on-line transactions were not allowed. In the case of the smaller releases, this period lasted a few days to a week. For the major release, it lasted almost three weeks for some types of transactions. This was necessary in order to close out the old system and bring up the new system. A manual process for handling "emergency transactions" was set up to keep the business running during the "dark period".

In addition, a detailed "Go Live" sequence of events (SOE) was developed to define the exact events which would need to occur in the final two to three days in order to "Go Live". This SOE included such things as final data validation, last minute code migrations, notification of users and HelpDesk of user lockout, reconciliation of previous period close, opening of new period, notification of Oracle regarding production status, input of "dark period" transactions, enabling user logins, etc. The SOE showed the events and the order in which they needed to occur, as well as the approximate time (hour) they would occur, and who was responsible to verify that it had occurred.

Detailed Transition Checklists

This section contains detailed checklists for each of the ten transition tasks as they were used at JPL. These lists itemize the individual activities which must be accomplished and tracked within each task. However, should another company wish to use these checklists, the lists would need to be tailored somewhat to reflect that company's infrastructure, architecture, and relationship to any other projects or subcontractors.

Hardware/Software Rollout Checklist

1. NBS users are identified and prioritized (e.g., functional users, administrative users, HelpDesk).
2. Software configuration is setup on users' desktops (AFS, Oracle client, User Name, default password, SMS).
3. Users' printers are registered on both NBS Server and production Oracle instance.
4. Citrix MetaFrame is rolled out to managers (for managers who approve only, e.g., requisition approval).
5. Coordination with the Enterprise Information System Project is accomplished.
   (re. AFS accounts and passwords, network port activations and Domain Name System (DNS) names, unique user names, etc.)
6. Discoverer (reporting tool) users are identified and client is rolled out.

Customer Support Readiness Checklist

1. Operating Level Agreement with the contractor for desktop support and system administration is signed off.
2. Desktop and Network Support Customer Support Center (for reporting and troubleshooting problems related to desktop hardware and software) is staffed, trained and ready for production.
3. Institutional Business System Customer Support HelpDesk (for general administrative systems support) is staffed, trained and ready for production.
4. Division of responsibilities and hand-offs between the two Customer Support Centers is defined.
5. Computers, phones, and automatic call distribution (ACD) router are installed for HelpDesk personnel.
6. HelpDesk problem management tool (Remedy ARS) is configured for operations environment (schemas, assignees, accounts, reports, etc.)
7. Customer support scenarios, frequently asked questions (FAQs) and triage approach are defined and communicated to HelpDesk personnel and managers.

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System Operations Readiness Checklist

1. Production hardware (servers, peripherals, uninterruptible power supplies (UPSs), etc.) are installed, configured, tested and under configuration management.
2. Operating system (OS) is installed, configured, tested and under configuration management.
3. System administration (SA) procedures and responsibilities are defined.
4. Database management system (DBMS) is installed, tested and under configuration management.
5. Database administration (DBA) procedures and responsibilities are defined.
6. All automated operations tools are installed, configured and tested for production environment . (tools for system administration, server backup, database backup, database administration, desktop software distribution, problem management, configuration management, disk/volume management, job scheduling, system and database monitoring, server security).
7. Configuration management and instance management processes and procedures are defined and enforced.
8. Service Level Agreements are written, approved and signed off.
9. Business job sequencing is defined, and job production schedule is defined and implemented in the automated job scheduling tool (daily, weekly, monthly, quarterly jobs).
10. Security architecture is defined and in place:
    a) Security policies are defined and implemented.
    b) Oracle user responsibilities are assigned.
    c) Audit validation reports are developed.
    d) Access controls and approval process in place.
11. Disaster recovery procedures and responsibilities are defined.
12. Period end (month, quarter, fiscal year, calendar year) processes and schedules are defined; module close order is defined.
13. Operations procedures are documented and responsibilities are assigned.
14. System startup sequence and availability dates and dependencies are defined.

Business Operations Readiness Checklist (prioritized)

1. Emergency transaction processes for use during the "dark period" are defined, documented and communicated.
2. Users are identified and assigned to responsibilities in Oracle applications (security).
3. Functional Subject Matter Experts (SMEs) are prepared to provide customer support for business processes and applications.
    a) Remedy Action Request System (ARS) client installed on SME's PCs.
    b) Remedy schemas for business processes implemented.
    c) Telephones are installed and Aspect client is installed on PC (for ACD router).
    d) SMEs identified and trained in processes, software applications, tools, and customer support skills.
4. Job processing sequence is defined and coordinated with system operations (daily, weekly, monthly, quarterly).
5. Job production information is input to job scheduler and coordinated with system operations (daily, weekly, monthly, quarterly).
6. All policies and procedures needed to support business operations are defined and documented.
7. Personnel are assigned to support operations and scheduled for training.
8. All process flows and definitions are completed and documented.
9. Any new job descriptions are created, and personnel are assigned to fill them.
10. Any needed organizational changes are defined.
11. Period closing and reconciliation processes are defined and documented.
    a) Month-end
    b) Quarter-end (taxes, etc.)
    c) Fiscal year-end
    d) Calendar year-end (W2s, etc.)
12. Business Operations Readiness Checklist is completed and signed off.

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The above business operations readiness checklist needed to be completed by the following ten business areas: Acquisition, Asset Management, Budgeting, Funds, General Ledger, Human Resources, Payroll, Project Accounting, Services and Timekeeping.

Business Applications Readiness Checklist

1. Oracle applications setup for each module is complete.
2. Oracle extensions for each module are complete (forms, reports, alerts, triggers, standard values, etc.).
3. Oracle application migration requests and patches are submitted to configuration management.
4. Custom code is complete and under configuration management.
5. Unit testing is completed.
6. Application Conference Room Pilot (CRP) testing is completed.
7. User acceptance is completed.
8. Technical documentation is updated and stored in the project repository on AFS.

The above business applications readiness checklist needed to be completed for every Oracle module, as well as third party applications and custom applications, whether new or existing. A detailed list of applications by function was created and monitored.

Data Conversion and Data Validation Checklist

1. Iteration 1 – Preliminary internal data conversion and validation is completed.
2. Iteration 2 – Verification of corrections and additional internal data validation is completed.
3. Iteration 3 – Verification of data mapping variations and auto-accounting; functional team acceptance is completed.
4. Iteration 4 – Financial data conversion and data validation is completed.
5. Iteration 5 – Final data conversion into production instance for all other applications is completed.

The above data conversion checklist needed to be completed for each of the following types of data: assets, benefits, customer order entry, funds, general ledger, inventory, payables, payroll, personnel, project costs, purchasing, services and work breakdown structure (WBS).

System Integration and Test (SIT) Checklist

1. Functional end-to-end testing for each function is completed.
2. SIT testing of functional threads is completed.
    a) Financial threads included: labor charges, purchase goods, subcontracts, inventory, unified chargebacks, month end, allocations/burden retroactive changes, contractor labor invoicing, interfaces to JIT purchase system and P-Card system, travel, labor adjustments, and services.
    b) Human resources and payroll threads included: probation, paid leaves, new hires, rehires, affiliates, change in retirement plan eligibility, changes in benefits eligibility, benefit age change, dependent change, insurance links, separation, paid to unpaid leave, job salary changes, allowances, organization changes, extended work week, retroactive time, and accruals.
3. Customer Support testing is completed.
4. Operations Tools testing is completed.
5. Security testing is completed.
6. Performance testing is completed.
7. System end-to-end testing is completed.
8. Data conversion transactional verification is completed.
9. Regression testing of functional threads is completed.

End-User Training Checklist

1. Acquisition training is scheduled and conducted according to plan.
2. Accounts payable training is scheduled and conducted according to plan.
3. Asset management training is scheduled and conducted according to plan.
4. Contract audit training is scheduled and conducted according to plan.
5. Discoverer (reporting tool) training is scheduled and conducted according to plan.

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6. Funds Administration training is scheduled and conducted according to plan.
7. General Ledger training is scheduled and conducted according to plan.
8. Human Resources training is scheduled and conducted according to plan.
9. Project Accounting and Budgeting training is scheduled and conducted according to plan.
10. Oracle Navigation training is scheduled and conducted according to plan.
11. Services Administration training is scheduled and conducted according to plan.
12. Timekeeping training is scheduled and conducted according to plan.
13. Web Transaction Control training is scheduled and conducted according to plan.
14. SME Orientation and tools (customer support skills) training is scheduled and conducted according to plan.

Project Transition Communications Checklist

1. Rollout process and charges are explained to users.
2. Year-end cutoff dates are defined and communicated.
3. Emergency transaction approach and contacts are described.
4. "Dark period" identified and "Go Live" schedule is communicated.
5. Availability of training sessions is communicated.
6. Presentations and demos of what is to come (to manage expectations) are planned and conducted.
7. Customer Support information and where to get help is communicated.
8. Terminology crosswalk from the legacy system to the new system and new processes is provided.
9. Description of the various Oracle instances is provided.
10. Security approach for roles and responsibilities and how to request access is described.
11. Project Web page is designed, implemented and updated with latest information.
12. Frequently asked questions (FAQs) and Answers of the Day developed and communicated via e-mail.

Management Readiness Checklist

1. Transition Plan Review is conducted.
2. Weekly Transition Status Reviews are conducted.
3. Operational Readiness Reviews for each wave are conducted.
4. Risk mitigation strategies are defined and implemented.
5. Accounting compliance and legal compliance are verified.
6. Contingency plans are defined and in place, if needed.
7. NASA Prime contract implications are understood and communicated.

Lessons Learned

Below is a summary of some of the lessons learned while deploying four releases over a six month period (June through December 1998). They are mostly common sense, but it never hurts to be reminded of what to expect, or to learn what worked for someone else, or to be warned of what to avoid.

1. Transition activities need to be planned and to begin several months prior to delivery or "Go Live", not just a couple of weeks before.

2. Integration across all transition tasks is essential. A project is like a mobile: if you pull on one part, then other parts are affected by the change, and sometimes in unexpected ways!

3. Assign a separate Transition System Engineer to oversee all transition activities and to facilitate coordination and communication across the various tasks. The Transition System Engineer should not have other significant duties during the transition phase, e.g., it shouldn't be the Project Manager or the Development/Implementation Manager. Also, he/she must be a "Connector" personality type, i.e., someone who understands the implications of various changes and their potential ripple effects in other areas.

4. The timing of the releases is very important either to coincide with the end of a reporting period, such as the end of the fiscal or calendar year, or so as not to impact peak periods for the organization, such as the budgeting cycle.

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5. It is a good policy to make the first release relatively small in order to provide the opportunity to work out the kinks in the processes for delivery, customer support, system operations, etc., in a relatively "safe" environment.

6. The act of delivering takes a couple of weeks. People will try to push against the deadline boundaries, but you MUST protect the transition period.

7. Business units need to do "the daily laundry" of running the business and also support the preparations for the new processes. Assign key contacts from each functional team on the project to interface with key contacts from the corresponding business unit, e.g, acquisition, finance and human resources. Create a list all business processes and procedures, and track progress towards preparations for operating them in detail.

8. Much coordination is needed between the system operations team and the business operations units to refine the production job scheduling and to set priorities (e.g., no backups or upgrades during peak processing times such as month-end close or payroll processing).

9. "Features" and workarounds discovered during SIT testing need to be passed on to the training team to incorporate into their training curriculum, and to the system and business operations teams who may now need to do more manual processing.

10. Track and communicate status religiously. Track overall status for each task, plus detailed status using simple terms such as red, yellow or green. Each item which is red or yellow requires an explanation of the nature of the specific concerns and progress towards resolving them. Use detailed checklists to ensure that all parts of the task are completed.

11. Make sure that your data validation of converted data includes people outside of the project. They will catch and find things that would otherwise be overlooked.

12. Executive sponsorship is absolutely key to success, especially during the transition phase.

13. Use an automated problem management tool to assist in tracking problems and in setting priorities.

14. Timely availability of comprehensive training for end users, especially functional users within the business units, is crucial to ensure that people understand how to use and operate the system.

15. Expect to work lots of overtime (nights and weekends) to deal with all the unforeseen problems, and to minimize the "dark period" when users are shut out of the system during transition.

16. Don't expect things to "get back to normal" for at least three to six months! Expect the initial month-end close process to be lengthy and arduous as the business units and users adjust to the new way of doing business with the Oracle Financials, especially to understand the implications of transaction controls on the ability to close a period.

17. Make sure you have adequate reports available soon after "Go Live" to run your business! Without sufficient reporting, it's difficult to tell what is going on and where operations problems may be hiding.

18. Celebrate each "Go Live" with enthusiasm, and make the effort to acknowledge all contributors publicly.

Summary

Transitioning to production is very different from development. It requires much planning and coordination to ensure a smooth transition. Make sure you know all the parts of the puzzle, and that you are actively working and tracking all the interfaces and issues. Make detailed checklists, and check them twice! Don't expect things to "get back to normal" for at least three to six months! When it's over, don't forget to celebrate enthusiastically!

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About the Presenters

P. A. "Trisha" Jansma served as the NBS Transition System Engineer during the implementation phase and transition to production. Throughout the project, she supported the NBS Information Technology and Systems Engineering Team with various systems engineering tasks and processes. Trisha has a broad background in systems and software engineering and information technology, previously in an engineering environment, and now in a business environment. She has worked with the Oracle Financials and HRMS for almost three years. She has a B.A. in Mathematics from Point Loma Nazarene University, an M.S in Computer Science from the University of Southern California, and an Executive MBA from the Peter Drucker Management Program at Claremont Graduate University.

Marc Montgomery served as the NBS Program Manager during the implementation phase and transition to production. Earlier in the NBS Project, he managed the NBS Acquisition Team during the business process reengineering and general design phases. His professional experience has been in the Acquisition (Procurement) Division at JPL where he has held management positions in the Purchasing department, was the project manager for the implementation of the legacy purchasing applications, and was the Coordinator for the Total Quality Management (TQM) Program for JPL's administrative divisions. Marc has a B.A. in Economics and Psychology from the University of California, San Diego.

David Werntz served as the Manager of the NBS Information Technology and Systems Engineering Team throughout the project from current state assessment through detailed design, implementation, test and transition to production. David has a B.S. in Engineering and Applied Science from the California Institute of Technology (Caltech), and an M.S. in Computer Information Systems from Claremont Graduate University. He is currently the Integration Engineer for the Administrative Process Engineering (APE) Project at Caltech where they are also implementing Oracle applications.

Michael Payne served as the Ernst and Young (E&Y) Consulting Engagement Manager and System Implementation Partner for the NBS Project, beginning during the design phase and through transition to production. He is a Senior Manager with E&Y's Pacific Southwest Management Consulting Group. He has 16+ years of industry experience with Repetitive and Process Manufacturers, Retail Distributors, Consumer Products, and Medical Instrument Companies. He has completed large-scale IT projects within the Entertainment Industry and Government Sector, and provides extensive experience in managing multi-site international system and process transformation projects. Michael has a B.S. in Computer Science (Business Administration Minor) from DePaul University in Chicago, IL and an A.S. in Tool and Die Design from Alliance College, Cambridge Springs, PA.

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In Memoriam

The presenters would like to dedicate this paper to Dr. Robert A. Somer, the Manager of the Product Implementation Section of the JPL Institutional Business Systems (IBS) Division throughout development, who died unexpectedly less than a month after the fourth delivery. ☹ Bob was a member of the Transition Advisory Group, and played a key role in the project since he managed the organization which provided most of the developers. May he rest in peace, and may all his future "transactions" be happy ones.

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